AMEMDMENTS TO THE SPECIFICATION, INCLUDING ABSTRACT:

ABSTRACT AMENDMENTS

An electrical current collector system has ~~comprising~~ an electrically conductive slip ring mounted to a rotatable shaft and a fixed conducting ring assembly forming a partially enclosed AC high voltage electrical current conductive ring channel in which slip ring contacting members are mounted. A compartment at ground potential at least partially encloses the slip ring and the fixed conducting ring assembly. A source directs a fluid into the compartment so that the fluid travels through into the conductive ring channel to perform at least one of cooling and cleaning of the slip ring contacting members. A hollow conically shaped insulator has a frustum with a narrower cross-sectional opening connected to the conductive ring channel and a larger diameter cross-sectional portion passing through and connected to the compartment for exhausting the fluid from the current conductive ring channel.

SPECIFICATION AMENDMENTS

[0001] The present invention relates to an electrical current collector for a high voltage rotating machine[[s]] and, in particular, relates to an insulator and filter used for cleaning and cooling the current collector.

[0014] FIGURE 1 shows a rotary transformer system 20 as disclosed in U.S. patent 6,465,926 issued October 15, 2002 to Rehder et al, which is incorporated herein by reference in its entirety, which includes both a rotor assembly 22 and a stator 24 having windings 25. The rotor assembly 22 includes a rotor cage section 26, rotor windings 21, slip rings (also known as collector rings and generally depicted by reference numeral 27), and a rotatable shaft 28. Rotor assembly 22 is rotatable about an axis RX of its rotatable shaft 28 in both a clockwise direction and a counter-clockwise direction. Rotation of rotor assembly 22 is effected by a drive motor 30.

[0019] Each of the fixed conducting ring assemblies 44 have brush assemblies 70 (slip ring contacting members) mounted thereon angularity about rotatable shaft 28 at intervals. Electrical current is transferred between the brushes of the brush assemblies 70 and the respective slip rings 27, and hence between the rotor assembly 22 and the electrical system connected to the fixed conducting ring assembly 44. The electricity travels between the slip rings 27 and the windings of the rotor assembly 22 over bus conductors 80. There is a bus conductor 80 for each of the three phases, e.g., bus conductors 80A, 80B, and 80C, only bus conductor 80C being shown in FIGURE 1. Each of the bus conductors 80 extends through a respective one of three phase isolated bus ducts 82 (only bus duct 82 being shown in FIGURE 1).

[0020] Referring to FIGURES 2 and 3, each fixed conducting ring assembly 44 comprises a U-shaped ring structure mounted on ring support

insulation post and a ring support shelf (not shown). The ring support shelf serves to form a partition or grounded metal sheet between the subcompartments 57 of compartment 56. Reference may be made to the aforementioned U.S. Patent 6,465,926 for a more detailed description of the insulation posts and support shelf.

[0022] The fixed conducting ring assemblies 44 of each phase plane have brush assemblies 70 situated and mounted thereon in the manner shown, e.g., in FIGURE 2 and FIGURE 3. The brush assemblies 70 are positioned at angular locations about rotatable shaft 28 in the manner shown in FIGURE 2[[3]]. In the example illustrated embodiment, each U-shaped ring structure 44 has eighty six brush assemblies 70 provided thereon in forty three pairs, with forty three brush assemblies 70 being suspended from beneath the top conductive ring plate 200T and another forty three brush assemblies 70 being mounted on bottom conductive ring plate 200B.

[0025] Referring to Figures 2 and 3 a hollow conically shaped insulator 400 is shown extending from the wall 200W of the conductive ring channel 44. The hollow insulator 400 is connected to the compartment 56 by a flange 410 that has bolts 424 passing therethrough. The hollow conical shaped insulator 400 has a frustum shape 414 that extends between the fixed conducting ring 44 and the compartment wall 56. The frustum 414 has a series of ribs 432 that provide increased electrical creepage length to the insulator and the O-ring 423 allows for any expansion between dissimilar materials of the insulator 400 and the fixed conducting ring 44. As best seen in FIGURE 3, the fixed conducting ring 44 has an opening 49 in wall 200W and is provided with an annular flange 422 comprising a copper material. The insulator 400 has a narrower end or opening 418 inserted into the annular flange 422 and held in place within the copper flange 422 by the O-ring 423. This attachment allows for some slippage ~~or~~ between the insulator 400 and the conductive ring 44 due to dissimilar rates of

thermal expansion of these parts. The insulator has a larger diameter cross-sectional portion 465 that passes through and is connected to compartment 56. It should be understood that the insulator 400 comprises a cycloaliphatic epoxy or may comprise any other form of suitable electrical insulation made from a polymeric epoxy or ceramic such as porcelain.

[0027] Figures 2 and 3 further show a collection chamber 430 which comprises a rectangular shaped chamber having side walls 431 and flanges 429 mounted by bolts 434 to the compartment wall 56. It should be understood that for higher current ratings, the chamber 430 may be cylindrical in shape. The side walls 431 are **[[is]]** provided with an inturned flange 442 bolted thereto. Flange 442 has filter 420 mounted and supported therefrom. The filter is a conventional industrial filter for carbon dust so as to eliminate carbon dust having particle size of less than about 1 micron. As a result, the use of the filter and the insulator provides an effective manner for allowing the fluid to escape along path 334G thereby permitting for a cooling of the fixed conductive ring and at the same time eliminating or removing the carbon particles by the filter 420 from the fluid stream 334F.